

Missouri Resources Magazine

Fall 1998

Table of Contents

Director's Comments



Angling For a Parks Patch

by Janet Price



Utility Restructuring

by Jim Muench



Missouri's All-Purpose Map

by H. Dwight Weaver

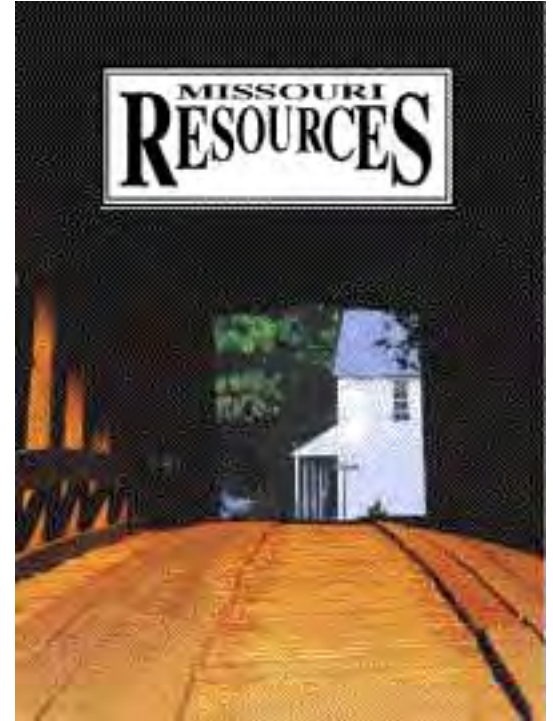


Departments

News Briefs, Environmental Notes, Top Spots,
Resource Honor Roll
and Letters

Resources to Explore: Bollinger Mill State Historic Site

by Jack Smoot



FRONT COVER: This westward view from inside of the 140-foot Burfordville Covered Bridge at Bollinger Mill State Historic Site in Cape Girardeau County frames the simple, historic charm of an antique store that was built in the late 1800s. Photo by Nick Decker.

BACK COVER: A sure sign that fall has arrived in Missouri is when the glossy, blue leaves of the Carolina buckthorn fade to orange. This small tree with black berries thrives in state parks located in the Ozarks. Photo by Nick Decker.

Teacher's Notebook: Environmental Education: The Filling for the Pie

by Joe Pitts



One Last Word: Deposits of Beauty

by H. Dwight Weaver



FRONT COVER: A Missouri sunrise symbolizes a new era for solar energy applications.

Missouri Resources Magazine

Fall 1998

Comments from the Director:



Many are not familiar with the poem, "A Fence or an Ambulance," by Joseph Malins. It centered on whether to put a fence at the top of a hill or an ambulance in the valley to deal with the site's many accidents. There were arguments both ways.

It amazed me that there was enough discussion on both sides to justify a lengthy poem. I felt the answer was obvious. Prevent accidents before they happen. Right? Seems only logical?

Well, maybe it is logical but often in life we do just the opposite. Sometimes we refuse to admit there even is a problem; or we study the issue so long our mere delay turns a problem into a full-blown crisis. Sometimes we treat a severe gash with a Band-Aid hoping we won't need stitches, so to speak. Later, we end up with an infection .

Well, fortunately in Missouri we've all decided to be a lot more proactive when it comes to the quality of our state's water. Missouri residents, elected officials and other concerned parties have all said "yes." We must move forward and assess the conditions of the state's watersheds and develop strategies to restore and protect them. You have decided, with the help of the Department of Natural Resources, to take an affirmative step forward to ensure that our waters meet clean water goals.

The most recent example of this commitment was the Table Rock Watershed Water Quality Meeting, held August 26 at the Dewey Short Visitor Center on Table Rock Lake. The purpose of the meeting was to discuss and help interested parties understand the present and historical water quality trends in the lake. More importantly, to begin to solve the problems that have been identified. More than 100 people attended the meeting to discuss regulatory and voluntary actions, local watershed management initiatives and other options which would help reverse the current negative impact on Table Rock Lake and its James River arm. In addition, DNR just completed inspecting all 124 wastewater treatment facilities that discharge into Table Rock Lake. Large or small, we want to ensure that they are operating properly and their impact is as minimal as possible. We also are involved in many other initiatives including supporting the James River Partnership.

Although Table Rock currently is the center of a lot of activity, it isn't even close to being the only effort in the state to jumpstart protection of our waters before it is too late. Many citizens are involved directly, either through Stream Teams or their own involvement. We applaud their activities and support. This plan will help them, other agencies, local governments, landowners and other interested citizens in beginning to deal seriously with water quality issues that we all face.

Along with the blessings that our bountiful water resources offer, goes the massive responsibility of maintaining their viability forever. Other states and even nations can only dream of the opportunity. As you may have read in recent weeks, the world is most probably facing a drinking water shortage in the next 20 years. How widespread and how critical might well depend on water resource decisions we make today.

Let's be thankful we even have the chance.

A handwritten signature in black ink, reading "Steve Mahfood". The signature is written in a cursive, flowing style with a large initial "S" and a prominent "M".

Steve Mahfood
Director, Missouri Department of Natural Resources

Missouri Resources Magazine

Fall 1998

Angling for a Parks Patch

by Janet Price

photographs by Nick Decker

Ten-year-old Scott Wilson came in looking for me. He had been here earlier, but I was gone. Would I be here yet? The anxiety showed on his face.

Scott had been working hard ever since his trip to Bennett Spring State Park, where he heard about the Missouri State Park Junior Naturalist Program. His reward would be the coveted junior naturalist patch. Scott had big plans for that patch. He planned to display it in the place of honor on the shoulder of his jacket.



Devon Stolle, 12, of Eureka came into close contact with this Great Plains rat snake while securing a junior naturalist patch for identifying the reptiles.

Missouri state park naturalists like myself are anglers – always "fishing" for a way to catch your attention. The Junior Naturalist Program encourages "children" of all ages to participate in nature programs and activities at the state parks. You are the fish we want to catch, and the patch is the bait we use. In Scott's case, Bennett Spring State Park hooked him. I reeled him in.

Scott, who lives in Eureka, received his patch today. His family and friends looked on proudly. But the patch is not all he received for his efforts. Hopefully, he also gained a new appreciation and respect for the natural world around him.

In case you haven't noticed, we want you! Once we've caught you and you've earned your patch, we don't throw you back. We don't practice catch-and-release here. Instead, we encourage you to do it all over again. Each subsequent completion earns you a gold star patch. You can earn as many as you like.

Jimmy Myers of Barnhart is a regular camper at several Missouri state parks. The naturalists know him well, since he has already earned his 15th star. Jimmy has them all sewn on a special jacket. Seven stars form the constellation of the Big Dipper. The rest line the collar of his jacket. Jimmy has proudly displayed his jacket at evening nature programs, inspiring others to try their hand at earning a patch.

Jimmy earned his first junior naturalist patch in 1991. He was six years old. Jimmy was very excited and has been

every time since. I asked him if he was getting bored with doing this every summer. Without hesitation, he answered "No!"

Jimmy has learned about turkeys, bats, deer, bears and other animals. What are his favorite animals? Well, those would have to be snakes. He probably is better at snake identification than most adults who visit DNR state parks.

And by the way (parents, you will want to pay attention here), a fringe benefit to all of this is better success in school. Jimmy has been doing exceptionally well in science, having a definite edge over the other students in his class. And guess what – even Dad has learned from it, having earned a patch and a star himself.

Still think this program is child's play? Lois Heber of Florissant doesn't think so. She is the "Senior Junior Naturalist." That's what her shirt says, anyway. Since retiring from teaching, Heber has spent a lot of time traveling. She has been to all 50 states, several foreign countries and all Missouri state parks and historic sites.

In the last 19 years, Heber has completed the junior naturalist requirements more than 50 times. A few quick calculations show that she has spent time in 208 naturalist programs, put in 156 hours of service project time, completed more than 52 nature studies, documented more than 52 identifications and helped out with 104 naturalist activities. Her zeal for life and obvious love of nature is an inspiration to many. Heber is the first and only person to earn that many awards.

Heber's portfolio is a three-ring binder with photographs, poems and crafts she has created as part of the junior naturalist program. But her true showpiece would have to be her T-shirt covered with patches and stars. When asked what she would do when she runs out of room on the front, Heber smiles and replies, "I still have the back!"

Heber was a big fish to catch, but fish often swim in schools. Missouri's Junior Naturalist Program is a great project for families to work on together. Connie Merlotti from Sunset Hills can attest to that. Merlotti and her three children, Yvonne, Christina and Tony, have participated in the program for 10 years. They are such dedicated regulars that they bring their own glue to the crafts!

It all began on a hot Fourth of July weekend in 1988 with, well, a bug. The Merlottis spotted a large, clumsy flying insect on a nearby lantern post. They collectively wondered, "What is that?" Teresa Aemisegger, naturalist at Onondaga Cave State Park, identified the insect of interest as a dobsonfly. "They start their life in the water," she said. "They make good fish bait, too!" Apparently fish aren't the only thing lured to the dobsonfly; Merlotti and the kids were attracted, too. From that moment on, they were hooked.



Aemisegger told the family about the Junior Naturalist Program. Four patches and 67 stars later, the Merlottis are still going strong. Their enthusiasm is evident. Yvonne, now 17, enjoys getting out into the country. Christina, 14, likes meeting old friends and making new ones at the parks. Fishing is one of 12-year-old Tony's favorite activities, even though it means missing Saturday morning cartoons.

As for Connie Merlotti – she just thinks it's fun! "You get to learn stuff; it makes you feel real good, and you get this neat patch," she said. For this nature mom, the program truly is more than just fun. She dreams of working as a state park naturalist someday. The hook is set.

As for her children, Merlotti hopes they will learn the love and respect for nature that she feels. It must be working – Christina wants to be a "Buggie-ologist." Fitting, since it all started with a bug. Bugs are good bait.

Hang in there, Connie, for your dreams just may come true. Dreams become reality. Libby Lancaster knows.

Lancaster's dream started with crawdads (crayfish). Or maybe it was a nightmare, for 10-year-old Libby Lancaster was terrified of the crawly creatures. Marian Goodding, naturalist at Montauk State Park, helped Lancaster to get over her fear and to earn her first junior naturalist patch.

The patch was an inspiration to Lancaster. Fear soon changed to awe. Future fishing trips with her father found Lancaster busy "fishing" under rocks, the crawdad's home of choice. As a child, Lancaster followed Goodding around the park. As a college student, she continued to follow in Goodding's footsteps, working two summers with her at Montauk State Park. "Those were the best two summers of my life," Lancaster exclaimed. "I was afraid Montauk would lose its magic if I worked there, but it didn't. Such a marvelous experience," she added.

Lancaster was so hooked she changed her college major to biology with environmental education, returning to Montauk State Park to study the spring and creek for her undergraduate research. Graduate school led to a master's degree in aquatic ecology. Today she's still looking at creek critters – even some of those once-terrifying crawdads.

Libby Lancaster found a full-time naturalist position in Arkansas. She described the park as "stunning, but it won't ever be anything like Montauk for me." She now is living in Germany, where she plans to continue her naturalist work. She says if they don't have a Junior Naturalist Program overseas, she will start one herself.



A group of junior naturalists search the banks of Big Creek in Sam A. Baker State Park for invertebrates to identify. Field trips are just one of the ways the program promotes in-depth environmental learning that enhances one's appreciation for the natural world.

If you ask her how she feels about the Missouri Junior Naturalist Program, Lancaster will tell you this: "So many people walk through the woods and see leaves and trees, instead of sassafras and black oak. Marian encouraged me to sit still and really experience nature." Experience. The Junior Naturalist Program turns "just a vacation" into a meaningful experience – an experience that just might affect the rest of your life.

When the naturalists at Missouri state parks caught Lancaster, they caught a big one ... and didn't let her get away.

Now it is your turn. Come out to the parks. Learn a little. Have fun a lot.

Once you experience the Junior Naturalist Program, you'll be hooked. We don't want you to be the "one that got away."

Missouri State Park Junior Naturalist Program

The Missouri State Park Junior Naturalist Program saw its beginning in 1979 at Roaring River State Park. What began merely as a means to increase participation in park programming has become a vital part of the visitor contacts at parks statewide. The program promotes in-depth learning, providing the visitor with an enhanced appreciation for both the parks and the natural world.

All visitors to Missouri state parks are invited to participate in the Junior Naturalist Program. After completing several requirements, such as attending nature programs and learning about plants and animals, successful candidates are presented with their first junior naturalist patch – the bluebird.

How can a simple patch inspire visitors to develop an ethic of responsibility for the world around them? Part of the inspiration is the enthusiasm and dedication of park naturalists. Being a state park naturalist is more than a job – it is a calling.

Naturalists give time and individual attention to candidates as they work on completing their junior naturalist requirements. One requirement has visitors contemplate what their world would be like without a particular plant or animal. Once the visitors see that they also are affected, they can better see the connection between themselves and other components of the natural world.

The junior naturalist patch is more than just a reward for completing program requirements. It is a visible symbol of commitment to the environment.

Visitors are given a chance to be creative as they make a plant or animal using only natural substances, like leaves or stones. Some have developed posters which are used in future naturalist programs. Many have written poems expressing their experiences in the parks, such as this one by seven-year-old junior naturalist Lois Guenther-Smith:

State Parks
In our state parks we have many trees,
That blow very pretty in the breeze.
And the campsites blaze so bright,
To bring to us light in the night.
Park rangers teach us lots of facts
About nature and how an animal acts.
I can't wait to visit here again,
So I can learn things without end.
Lois Guenther-Smith

The idea for the Missouri Junior Naturalist Program came from a similar program in Indiana. Roaring River State Park was the first Missouri state park to institute the new program. However, it didn't stop in Missouri.

By November 1983, the program was adopted by Gulf State Park in Alabama. Five Missouri junior naturalists had visited the Alabama state park and their enthusiasm led an environmental education specialist to develop her own "Junior Ranger" program.

Missouri's Junior Naturalist Program has been used as a vehicle to celebrate 50 years of Missouri naturalist services in state parks. In 1938, Meramec and Roaring River state parks were the first to enjoy programs and services presented by park naturalists. By 1988, 14 state parks had full-time naturalists, with an additional 15 parks having seasonal naturalists. Today, 21 full-time naturalists and 69 seasonal naturalists present a variety of visitor programs.

Recently, the Missouri State Park Junior Naturalist Program received national recognition. The program was included in Renew America's 1997 Environmental Success Index. This one-of-a-kind database of successful environmental programs identifies programs nationwide that provide innovative solutions to tough environmental challenges. Missouri's Junior Naturalist Program was honored based on the evaluation of four important criteria – program effectiveness, natural resource conservation, economic progress and human development.

Since its humble beginnings at Roaring River State Park, the Junior Naturalist Program has become a nationally recognized environmental program. It has grown to include parks statewide and has spilled over Missouri's borders into other states, and even other countries. More than 28,000 people recognize it as an important part of their park visit.

Promoting an appreciation and respect for parks and their resources is only the first step in something much larger. When that appreciation and respect grows to include the world around us, we all come up winners.

Janet Price is the naturalist at Johnson's Shut-Ins State Park within the Department of Natural Resources Division of State Parks.

Missouri Resources Magazine

Fall 1998

RESOURCES TO EXPLORE

Bollinger Mill State Historic Site

by Jack Smoot

photographs by Nick Decker



The rare combination of a 19th-century water-powered gristmill and a 140-foot wooden covered bridge provide visitors to Bollinger Mill State Historic Site a unique opportunity to literally cross a bridge to the past.

The covered bridge recently has undergone an extensive restoration, and once again, visitors can admire the skill and ingenuity of its builders during a leisurely stroll across the Whitewater River. A guided tour of the mill offers sights and sounds of grinding corn into meal with water-powered millstones and an opportunity to see many types of machines and processes used to make flour from wheat. The historic setting of these two

National Register structures in Cape Girardeau County also provides a wonderful backdrop for a family picnic in the day-use area.

The mill, as seen today, is a four-story stone and brick building built in 1867 and is the third mill that has stood on the site. George Frederick Bollinger built the first mill in 1800. Bollinger left his home in North Carolina in 1797 to seek his fortune and met Louis Lorimier, the Spanish commandant for the region, in Cape Girardeau. Lorimier promised a land grant to Bollinger if he would help to settle the area. So Bollinger returned to North Carolina and on New Year's Day, 1800, he crossed the Mississippi River with 20 families. The group included six brothers and nephews, helping Bollinger to become a well-established name in the region, even to this day. Together they formed the Whitewater settlement and Bollinger proceeded to build his first mill.



A collection of rollstands at Bollinger Mill represent the evolution of the roller milling process from the mid-1800s to the turn of the century. Only a few historic mills remain that interpret this important milling process for the general public.

Bollinger replaced the first mill in 1825, apparently preferring a more substantial structure. His new mill had a

limestone foundation with a wooden upper story. When Bollinger died in 1842, his only child, a daughter named Sarah Daugherty, inherited all of his property. At the beginning of the Civil War, one of Sarah's sons was accused of firing at a Union wagon train coming through the area. In September 1861, Union troops burned the mill in a fiery retaliation.

Solomon Richard Burford purchased the remains of the mill and property from the family in 1866. The following year he rebuilt the mill by adding three stories of brick to the existing limestone remains of the older mill, which included the foundation and first floor. This mill is the one that visitors see today.

Burford also was responsible for hiring a surveyor to lay out lots and streets for the community that was named for him – Burfordville. Burford later sold the mill when he left to serve in the Missouri legislature in 1880.

The mill was bought and sold several times in the next few years but finally became part of the Cape County Milling Co. in 1897. The Cape County Milling Co. consisted of three mills. Mills "A" and "B" were located in nearby Jackson and the mill in Burfordville was called Mill "C". By 1914, the three mills combined were shipping 1,400 to 1,500 barrels of flour daily out of Jackson. The Cape County Milling Co. shipped their product by rail throughout the country and their patent flour, called "Gold Leaf," won blue ribbons at many state fairs across the South. The Cape County Milling Co. also was the first in the country to test the Alsop electrical flour-bleaching process. This process later became widely used throughout the milling industry.

It is believed that the last time the mill at Burfordville was used commercially was around the end of World War II. Clyde Vandivort purchased the building when the company liquidated in 1953. Vandivort was a farmer who used the old mill for storage for a few years, but through the rest of the 1950s the mill sat idle and suffered from vandals and old age. In 1961, the Vandivort family, descendants of the Bollingers, donated the mill to the Cape County Historical Society. In 1967, the society turned the property over to the Missouri State Park Board, which operated the state park system at that time. Today, the state park system is operated by the Missouri Department of Natural Resources.

Throughout most of the history of the two mills that George Frederick Bollinger built on the Whitewater River, travelers wishing to cross the river used a ford located downstream from the mill. Joseph Lansmon began construction of a covered bridge in 1858, but it is unclear whether the bridge was actually finished before or after the Civil War. No mention of the bridge is made in St. Louis newspaper accounts of the mill burning in 1861.

The bridge made the trip west from Jackson easier, especially for farmers driving wagons loaded with grain destined for the mill. The Cape Girardeau Macadamized and Plank Road Co. built the road that went through the bridge. It was a toll road and tollhouses were located about every five to six miles along the route. Tolls were charged until 1906 when local farmers, tired of waiting for the Missouri Supreme Court to abolish the tolls, broke down the gates and used the roads without bothering to pay.

Photographs of the bridge from the turn of the



Park historians know that construction began on the Burfordville Covered Bridge in 1858. However, it is unclear whether the bridge was actually finished before or after the Civil War. Currently, the bridge is in its best structural condition in decades, thanks to a 1998 renovation project.

century reflect periods of disrepair with missing siding and a collapsed roof on the west end. In June 1908, the county hired a contractor named Hamer Behymer to repair the bridge. His contract required that he replace the roof and any defective rafters, repair the siding and wing walls, straighten the braces, and rework the approaches. Behymer's payment for all of this work was \$390 and he was to provide the materials for the project. The Missouri Highway Department also carried out major repairs in the early 1950s.

The bridge formally became part of the state park system in 1967. A storm severely damaged the roof in 1971 and a new shake roof was constructed to replace it. In 1986, a construction firm was hired to replace the rotting ends of the lower chords where they rested on the abutments. But later that same year, a record flood occurred and the Whitewater River rose to a level of 17 inches

on the road deck through the bridge. The pressure of the current against the siding caused the bridge to move slightly on the east end and it was determined the bridge should be closed to vehicular traffic.

Later, after a thorough examination of the bridge, engineers determined that it would be best to completely close the bridge to all traffic, including pedestrians. The Department of Natural Resources began studies to determine the best way to repair the structure.

The most recent repairs to the bridge were completed in summer 1998. The most important part of the project was to repair the trusses, the components that actually bear the weight of the bridge. The timbers that comprise the lower portion of each of the trusses were completely replaced. Also replaced were the support timbers that cross from one truss to the other and the vertical steel rods that provide the necessary tension that allows the trusses to function. Although some damaged siding was replaced, every attempt was made to avoid altering the appearance of the bridge. The most visible change visitors will notice is the camber or "hump" in the bridge where there once was sag. Those who were most familiar with the appearance of the bridge before the restoration also will notice the ends of the bridge are no longer leaning in opposite directions but now face squarely.

Gristmills often were more than just a commercial component of the small communities that grew up around them. They also were social hubs. Farmers brought grain as well as news from the surrounding area. The millpond provided a place to fish or swim while waiting for the miller to perform his service. All of this activity made the mill an exciting place to be.

Today, in an attempt to promote a similar atmosphere, Bollinger Mill State Historic Site offers more than just daily tours of the mill and a beautiful, nostalgic backdrop for picnicking.

Yearlong special events provide visitors a sense of the excitement that must have filled the air around the mill. Traditional folk music concerts are presented in the spring and fall. The site offers special demonstrations and entertainment during a regional historic driving tour each spring. The season ends with a Halloween storytelling and light refreshments around a large bonfire in October.

Bollinger Mill State Historic Site has something to offer visitors with many interests. Technology buffs can admire the intricate machinery and see some of it demonstrated. Historians can study nearly a century of regional history while outdoor lovers can relax and enjoy this rare, rural combination of gristmill and covered bridge in its original, scenic setting.

Bollinger Mill State Historic Site is located in Burfordville on Highway HH off Highway OO from Highway 34 in Cape Girardeau County. For information on any state park or historic site, call the Department of Natural Resources toll free at 1-800-334-6946.

Persons with hearing impairments can call 1-800-379-2419 with a Telecommunications Device for the Deaf (TDD).

Jack Smoot is site administrator at Bollinger Mill State Historic Site.



Bollinger Mill offers visitors a hint of the 19th century, as water-powered millstones rumble to life, producing the sights and sounds of corn being ground into meal. The four-story gristmill was more than a commerce center. In its heyday, the mill was a social hub for farmers and merchants who brought in grain and local news from surrounding areas.

Missouri Resources Magazine

Fall 1998

Mother Nature's preferred way of disposing of fall's colorful leaf carpet is to let the leaves decompose where they land. This is not always an option for some landscapes – especially yards. Since leaves are an excellent source of carbon, nitrogen and other nutrients for a compost pile or bin, here are some tips on how they can be used as mulch or compost.

- Leaves that are placed in piles tend to shed water. Moisten and occasionally turn the leaves over.
- The ideal moisture content for composting with leaves is about 55 percent by weight. This should feel similar to a well-wrung sponge – damp but not dripping water.
- Leaf compost piles started this fall will be in prime condition to be mixed with grass clippings next spring and summer.
- Leaves contain a lot of carbon, usually a 50-to-1 ratio of carbon to nitrogen. Adding a little nitrogen in the form of grass clippings, fertilizer or cotton seed meal will assist the composting process.
- A mixture containing two parts chopped leaves and one part grass clippings would have a carbon to nitrogen weight ratio of about 30-to-1, optimal for composting.
- If grass clippings are not available as a nitrogen source, inorganic fertilizer can be used. Make certain that the fertilizer does not contain herbicides.

Source: University of
Missouri Outreach
and Extension



Missouri Resources Magazine

Fall 1998

LETTERS

I read with great interest your "Comments from the Director" in the Summer 1998 issue of *Missouri Resources*. It was an excellent article as was the entire issue.

I especially agreed with the the opening paragraph –

" ... this state offers some of the best waterborne recreation in the world." Unfortunately, we are steadily losing the second largest lake in the state due to increasing amounts of pollutants by cities in the upstream watershed.

Twenty years ago I visited Table Rock Lake and fished in the crystal clear waters of the James River arm. I now live on the lake and daily view the green/brown waters and see the algae growing on the docks and boats. Even as far downstream as Kimberling City, the lake takes on a green cast during the summer. When I first received *Missouri Resources*, I read the mission statement of the department and could only agree. Again, unfortunately, I feel that when Table Rock is considered, you are falling far short of accomplishing your stated mission.

I realize that farm runoff, septic overflow, lawn chemicals and other "individual-created pollutants" contribute to the problem and need to be corrected. I have also been told by DNR that over 80 percent of the water contaminates come from the sewer treatment plants of Nixa, Ozark and Springfield and another 10 percent from Arkansas cities that dump in the White River. I also realize how difficult it is to control or even locate "runoff sources." What I don't understand is why isn't more being done concerning especially the Missouri cities that are contributing the major portion of the problem? We mandated that Branson must clean up the waters dumped into Taneycomo. Why not mandate that Springfield, Nixa, and Ozark clean up the water they dump into Table Rock? That would not completely solve the problem, but it can be done and it would be a good start.

Thank you for listening. Please continue to work for the betterment of our environment.

Sincerely,
David Latimer
Cape Fair

Editor's note: In July, DNR announced an inspection initiative to protect Table Rock Lake. By the end of August, the Southwest Regional Office had inspected all of the 124 sewage treatment facilities that discharge directly into the lake. Additionally more than 100 people attended the Table Rock Watershed Water Quality Meeting on August 26. See this issue's Director's Comment by DNR Director Steve Mahfood for additional details.

In the current issue of *Missouri Resources*, I noted an article in the back that mentioned microfilmed county records.

I was not aware that such records existed.

This information is of great interest to me as I am searching for the land records and graves of some of my ancestors who were bushwhacked in Carroll County during the Civil War. I know that they owned farmland in Wakenda Township in an area known as "The Gourd," and aside from the family name, that's about all the information I have. Cemetery records reveal nothing. They are probably buried on their farm. If it were possible to learn exactly what land they owned and where it was in Wakenda Township, it would be a giant step toward finding more pieces of the puzzle. The Carroll County Abstract Co. declined my request for information. I'm also looking for other land-owning relatives who lived in Carrollton at approximately the same time and later.

So, if you are able to supply any information relative to this quest I would be extremely grateful.

One final note: I look forward to each issue of *MR* and derive a great deal of pleasure from the articles and pictures. Thank you in advance for your help you may be able to render, and please keep up the good work!

Jim Eisenhower
Belton

I enjoyed the article on the Lake of the Ozarks by Bob Hentges. My grandfather, Roy Cox, P.E., was involved with the construction of Bagnell Dam. After graduating from MU in 1917, he went to work for Stone and Webster. In the early '20s, about 1922 and '23, he was placed in charge of, I think, three survey crews who had the responsibility of surveying the high water line for land acquisition for the proposed lake. He had many stories of confrontations with local illbillies who mistook him for a "revenuer." When the dam construction began, he became an inspector for the project. I have a great series of photographs taken by him, beginning with the undisturbed valley at the site (8-19-29), and ending with the completed dam proper (2-25-31). These photos are all taken from the same location on the bluff over the northeast abutment. A final photo is an aerial shot taken from east of the dam when the lake is about half full. I have enclosed copies of technical information sheets prepared by him for, I think, a news conference held at the dam when the coffer dam was closed. I have before and after photos.

My grandfather went on to work for the Missouri highway department as a bridge designer where he stayed most of his career except for a stint as a professor at the College of Engineering in Columbia just after WWII.

Roy E. Obermiller, P.E.
Harrisonville

Letters intended for publication should be addressed to "Letters," *Missouri Resources*, P.O. Box 176, Jefferson City, MO 65102-0176 or faxed to (573) 751-7749, attention: "Letters." Please include your name, address and a daytime telephone number. Space may require us to edit your letter. You can e-mail *Missouri Resources* staff at moresdnr@mail.dnr.state.mo.us

Missouri Resources Magazine

Fall 1998

NEWS BRIEFS

GSRAD offers trading cards

One of the hottest new items coming off the press this year is the Geological Survey and Resource Assessment Division's 1998-99 trading card series. The cards focus on subjects related to Missouri's environment and natural resources.

This colorful set contains 40 different cards in nine different subsets featuring caves, dams, ice age animals, rivers, springs, rocks, minerals, wells and land surveying. Each card is numbered, with a photo on the front and text on the back. The cards are suitable for children and adults of all ages. They especially are designed with teachers and students in mind for educational activities. Card collectors, history buffs, rock collectors and spelunkers will enjoy them, too.

A new series will be introduced next year. The shrink-wrapped set sells for \$6 postage paid and can be obtained from DNR's Geological Survey and Resource Assessment Division, P.O. Box 250, Rolla, MO, 65402-0250, or call 573-368-2100. Readers can order cards by using the enclosed form in Missouri Resources. Credit card orders will be accepted by phone.

New recreation grants awarded

More than 20 local communities and organizations have benefited from two recent grant programs administered by DNR.

In July, 20 communities were awarded grants for outdoor recreation projects at a meeting of the State Inter-Agency Council for Outdoor Recreation. The grants were part of the Landmark Local Parks Program (LLPP), an initiative led by Gov. Mel Carnahan to make general revenue available to address parks and recreation needs expressed by local and county governments. In fiscal year 1999, more than \$4 million of general revenue was included in the budget for this program.

Communities and organizations receiving these grants included St. Louis County, West Plains, Campbell, Harrisonville, Grandview, Sweet Springs, Linn, Mansfield, Brookfield, Poplar Bluff, Nixa, Jackson County, Ste. Genevieve, Holts Summit, Tower Grove Park, Cabool, Arcadia, Lawson, Kansas City Department of Parks, Recreation and Boulevards and St. Louis Department of Parks, Recreation and Forestry.

In June, nine trail projects were approved for federal financial assistance for fiscal year 1998. The funds for the project were made possible through the National Recreation Trails Fund Act, which established a fund for development and maintenance of recreational trails and trail-related projects. The grants were recommended by the Missouri Trails Advisory Board.

Grants were awarded to the Conservation Federation of Missouri, Queeny Park Equestrian Events Inc., Nixa, Conservation Foundation of Missouri Charitable Trust, Parkville, Maryville, Open Trails of St. Joe and Finger

Lakes State Park, St. Joe State Park and Cycle World USA. Projects also were selected for fiscal year 1999, contingent upon the allocation of 1999 monies: Maryville, St. Joe State Park, Hannibal, Cycle World USA and Dennis Shrout.

New drinking water loan program

A new law signed by the governor will bring Missouri into compliance with the federal Safe Drinking Water Act Amendments of 1996. The legislature passed the Drinking Water Bill, which was sponsored by Reps. Gary Wiggins and Randall Relford. Sen. Wayne Goode handled the bill in the Senate.

"One of the most important aspects of the bill is the ability to immediately implement a drinking water state revolving fund loan program within Missouri," said DNR Director Steve Mahfood. "This will be a companion program to the state's highly successful Clean Water State Revolving Fund, which has provided over \$644 million in low-interest loans to Missouri communities to construct or upgrade wastewater treatment facilities since 1989. This program has saved ... communities an estimated \$190 million over conventional financing."

The new legislation authorizes the department to accept \$21.8 million from the U.S. Environmental Protection Agency and provide a state match of \$4.5 million.

DNR administers both the Missouri drinking water and wastewater loan programs. For more information, call 1-800-361-4827 or 573-751-1010.

New financial applications for EIARA program

Businesses applying for funds from the Missouri Market Development Program can obtain new application forms for fiscal year 1999 from the Environmental Improvement and Energy Resources Authority (EIARA).

"The new application should be more user friendly," said EIARA Director Tom Welch. EIARA oversees the program, which provides technical and financial assistance to companies that develop new products from recovered materials, such as plastic, glass, and wood.

One change in the new form is a maximum funding amount of \$50,000 per project. Also, companies that previously have received funding may reapply but must develop a new product and provide a 50 percent match.

Welch added that the program's purpose is to compliment other efforts that have helped reduce the volume of solid waste entering Missouri's landfills. Contact EIARA at 573-751-4919 or by fax at 573-635-3486.

Law authorizes alternative fuel

A new law will help improve the air quality in the St. Louis area by authorizing the use of a new air pollution fighter – reformulated gasoline (RFG).

Starting in summer 1999, drivers buying gas in the St. Louis area will be able to purchase RFG. The governor also authorized use of a state specialty blend in the area during the winter.

RFG is designed to burn more cleanly, which means less pollution. This will reduce ozone levels, which will provide better air quality and health for the area's citizens. The gasoline will cost about one to three cents a gallon

more than current fuel products.

During the 1998 legislative session, the General Assembly passed a bill that will help the St. Louis ozone non-attainment area improve air quality. The General Assembly removed a provision banning RFG use. It also granted the state the authority to implement a state-specialty blend gasoline in the St. Louis area, if appropriate.

At the legislature's request, DNR convened a fuel summit. More than 100 people from industry, commerce, government, environmental groups and the public attended the meeting at the University of Missouri-St. Louis to discuss fuel options.

DNR presented the fuel summit information to Gov. Carnahan, who signed the law in July.

Missouri Resources Magazine

Fall 1998

ONE LAST WORD

Deposits of Beauty

by H. Dwight Weaver

Mention the word "gemstones" and the first that come to mind are, of course, the most popular and highly desired – diamonds, rubies, sapphires and emeralds.

But unfortunately, these coveted gemstones in their natural state do not occur in Missouri. While it is true that trace amounts of such exotic minerals as topaz, serpentine, lazulite, marcasite, malachite, tourmaline, epidote, beryl and sphalerite can sometimes be found in the mines of Missouri, the crystal forms are usually of microscopic size and of such poor quality that they have no aesthetic or commercial value as gemstones.

"More than 60 gem minerals, mostly semi-precious, have been produced commercially from domestic sources, and at least one variety of gemstone occurs in each state," says a government bulletin.



In Missouri, chalcedony and agate are the leading gemstones. These are a cryptocrystalline, glass-like variety of quartz and look almost like opaque glass. They are almost 100 percent SiO₂ (silica). Silica is a mineral commonly used in household cleaners, porcelain figurines, paint, mirrors and computer chips. Impurities in trace amounts provide variations in color patterns and help name the varieties of the mineral. These impurities are what really make up the quality of a gemstone.

"Missouri has some very beautiful forms of agate, including Jack's jasper, zebra chert, amethyst, mozarkite, Lake Superior agate, Union Road agate and Missouri lace agate," said Art Hebrank, site administrator at Missouri Mines State Historic Site in Park Hills. The park, which is operated by the Missouri Department of Natural Resources' Division of State Parks, has an outstanding rock and mineral museum. The 25-acre site also features exhibits on geology, mineral resources and mining equipment.

Agates can be found statewide. They are particularly abundant in the glacial and stream gravels of north Missouri, and in gravel

(Above left) Agate's affordability and durability make the quartz stone a popular fashion accessory. Mozarkite (Above right) is a shining example of a form of beautiful agate that is abundant in northern Missouri.

pits in the floodplains of the Missouri River and Mississippi River in northeastern Missouri. But unless you are an experienced collector or lapidarist (gem cutter), you may find that it isn't always easy to recognize gem varieties in their natural condition. A good handbook on rocks, minerals and

gemstones is recommended for rock and mineral identification. The stones usually have to be cut and polished to expose their beauty and character. Agates generally are cut in a gem or bead-cut convex form. They are very hard and wear well.

At the beginning of the 20th century, agate settings in jewelry were in vogue. They were in fashion from 1880 to 1925 and also were popular because they were an affordable stone that could be worn by everyone. The most popular setting was in yellow gold or pinchback mounting, surrounded by small pearls.

One of the more prized forms of agate is amethyst, which is the pale lavender or deep purple variety of quartz. You can use a simple field test to separate real amethyst quartz from glass fakes. Lightly rest the unidentified item on your cheek: quartz has high thermal conductivity and will feel cool to the touch; glass, on the other hand, should feel warm.

Amethyst gemstones have been found in the filled sink deposits of Crawford, Franklin, Osage, Phelps and Washington counties while Bollinger, Lewis, Madison, St. Louis and Wayne are noted for agate and jasper deposits.

In the old days, people thought that amethyst could keep a person healthy. They also believed amethyst possessed the power to bring good luck, so people born in February must be among the luckiest of people because amethyst happens to be their birthstone.

H. Dwight Weaver is the division information officer for DNR's Geological Survey and Resource Assessment Division.

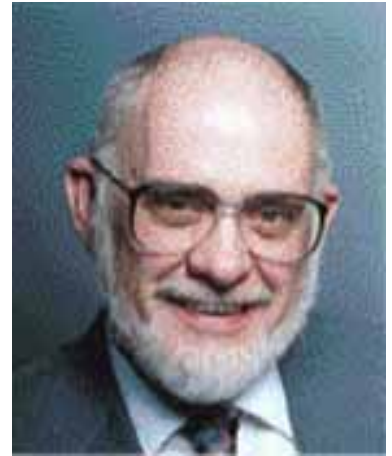
Missouri Resources Magazine

Fall 1998

RESOURCE HONOR ROLL

H. Dwight Weaver, a public information specialist with the Missouri Department of Natural Resources' Division of Geology and Land Survey, is the winner of a pair of national awards for magazine writing.

"When Giants Walked" was the winning story that Weaver wrote about Missouri's giant mammals of the ice age. The story placed second in the magazine general interest category from the Association for Conservation Information (ACI). This national organization includes information and education professionals that are employed with conservation and natural resource agencies. "When Giants Walked" was published in the Winter 1996-97 issue of Missouri Resources (MR).



H. Dwight Weaver

Recently, the department was notified that Weaver was the winner of another second-place writing award from ACI. This time he won in the parks article category for "Fountains of the Ozarks." The winning entry featured photos and text about Missouri's vast network of springs and was published in Spring 1997 issue of MR. The honor marks the fourth time that the author has won writing awards for the publication.

For 11 years, the St. Louis chapter of the Sierra Club has worked hard to restore the glades and savannas at Meramec State Park. Working more than 6,630 hours, the volunteers have helped clear brush and invading cedar trees to open up the glades and savannas so that vegetation native to the park can once again flourish.

At the heart of this volunteer effort is Penny Holtzmann, a medical records clerk at Veterans Hospital in St. Louis. For eight years, Holtzmann has helped organize the weekend work trips to the park. These trips are definitely not a walk in the park because they normally involve cutting brush and small trees, and dragging them to a pile to stack them for burning later. Holtzmann also collects native wildflower seeds, dries them in her garage and prepares them for spreading on the glades.

The group's efforts, led by Holtzmann, have made substantial contributions to restoring the natural landscapes at the park for the public to enjoy.



Penny Holtzman

Missouri Resources Magazine

Fall 1998

TEACHER'S NOTEBOOK

Environmental Education: The Filling for the Pie

by Joe Pitts

Environmental education can be used to integrate the slices of the curriculum pie. It is hard for educators to justify including another content area in their instructional plan. Teachers must deal with countless societal issues by blending them with the existing curriculum. With limited time and resources for curriculum adjustments, teachers probably ask, "Why should I teach about the environment?"



Addressing challenges to successfully teaching about the environment

- *Not enough time: "I can't teach another subject."*

One way to meet this challenge is to integrate the environment with existing course content. The environment is a powerful tool to help students reach educational goals through constructive, hands-on activities. Environmental education does not ask a teacher to stop and "teach the environment."

- *"I'm not an expert."*

The classroom of today emphasizes constructivist learning. The teacher is free to learn with students. This enhances student learning by providing an opportunity to model issue investigation techniques and strategies.

- *Administrative support: "My administrator doesn't understand environmental education."*

Ask your administrator to join you in some of the activities you have planned. Administrators are hard pressed to justify opposition when they witness the classroom synergism generated by study of the environment. Show them the list of reasons to teach about the environment included later in this article.

- *"I don't teach science."*

A common myth about environmental education is that only the science teacher should teach about the environment. Language Arts teachers may enrich their courses with the talents of authors such as Henry David Thoreau, John Muir, Aldo Leopold and Rachel Carson. Social Science teachers know that much of our social, economic and political history has hinged on the location, extraction and processing of natural resources.

- *"It's not connected to the Show-Me Standards."*

The environment is represented in the Show-Me Standards. Specifically, goal 1.3 and content standards for Science – 4, 5, 8 and Social Studies – 5 include study of the environment. The transition from knowledge-based Core Competencies and Key Skills to higher-level thinking skills measured by the Show-Me Standards illustrates a change in standards that is compatible with environmental education. Educators have discovered that environmental education can help their students achieve goals and standards required by the Outstanding Schools Act of 1993.

- *"I don't have specialized, expensive equipment."*

The beauty of using the environment to teach is that most activities require very little in the way of specialized equipment. Many activities can be conducted with materials found on the schoolyard, at home or in the classroom.

- *"It's not in the textbook."*

Great! This frees the teacher to use supplemental materials to design environmental activities around local environmental issues.

- *"It's not a core subject."*

While an environmental studies course is offered in many schools, environmental education is most effective when infused within and across disciplines and grade levels. Environmental-education activities are adaptable to any course content, grade level or general curriculum need.

- *"No resources are available."*

Quality materials and training on environmental education are available to supplement curricula and textbooks. The availability of low-cost or free environmental educational materials and training is appealing to administrators looking to strengthen courses.

- *"It's controversial!"*

True. Controversial issues can be examined in a classroom if material is presented in a fair, unbiased fashion and if all students are encouraged to participate. A 1997 Roper Survey found that 95 percent of adults and 96 percent of parents support the inclusion of environmental education.

- *"There are no correct answers to environmental problems."*

A strength of environmental education is that teachers do not need to know the correct answer. The days of fact-based education with unedited wisdom flowing from the front of the classroom are over. Using the environment creates a classroom where teachers and students work together in process-based learning.

Successful reasons to teach about our world's environment

- *Students always benefit from hands-on learning.* Ask students to help determine the amount of trash produced by their classroom or school. Have students conduct a survey of school energy use and suggest ways to increase efficiency. As they construct their own data collection strategies, students will take ownership of the data they collect while directly applying the principles of mathematics and science.
- *Learning with the environment is fun.* Whether outdoors or indoors, learning about the environment galvanizes student interest. The experience is real as opposed to the often contrived scenarios of textbooks and technology. No virtual frog can duplicate the learning impact of a living frog held by a student.

- *Nature provides not only the classroom but also its materials.*

In a rural or urban setting, the school yard offers many opportunities for observing nature. Have students keep journals and write about the textures, sights, smells and sounds of nature. Student journals may include drawings of structures, plants and animals. Rural schools usually are close to relatively undeveloped areas that can be used for environmental studies. Urban schools also have nearby places where the environment can be studied. Vacant lots make excellent areas for study of the environment. If practical, a field trip to a nearby Missouri state park will provide many opportunities for study of the environment. If an outdoor area is unavailable, then conduct a class investigation into school energy use or trash production. The opportunities are unlimited. Ask your students for ideas, you may be surprised by the creativity of the suggestions.

- *The environment is relevant to students' lives.*

Whether it is the milk they drink for lunch or the video game they play at home, everything students need, own or use comes directly or indirectly from natural resources found in the environment.

- *Environmental topics cross all discipline areas.*

Because environmental issues cross social and political boundaries, the environment is an excellent vehicle for teaching about science, social studies, language arts, mathematics and art. Gathering information in the study of environmental issues develops students' problem-solving skills.

- *Environmental issue investigation teaches students "how to think," not "what to think."*

Students become active learners and begin to examine all sides of an issue. Students also learn to compare sources of information and recognize bias in information about issues.



Alicia Stolle, 9, of Desloge examines a frog on a field trip. This type of hands-on learning cannot be provided by books or computers.

The environment provides people with all of the needed resources to maintain life.

Government agencies cannot protect natural resources simply by passing regulations and improving

technology. It requires citizen participation. Most Missouri citizens have been students regardless of their occupation, status or level of education.

Education on the environment can help citizens take an active and creative role in decisions about solutions to environmental problems. Protecting society's basis for economic and physical well being makes good, common sense.

Integration of environmental education with existing school curricula ensures that the people who are using the resources ultimately will protect the environment.

For more information about environmental-education programs and materials available from the department and other sources, contact the environmental education unit at 1-800-361-4827.

Joe Pitts is an environmental education specialist in the Division of Environmental Quality's Environmental Assistance Office.

Missouri Resources Magazine

Fall 1998

The Topographic Quadrangle Missouri's All-Purpose Map

*by H. Dwight Weaver
photographs by Nick Decker*

Even though some people aren't sure just what to call them, the Missouri Department of Natural Resources' Geological Survey and Resource Assessment Division sells more than 32,000 of them each year. They are purchased by hunters, hikers, anglers, cave explorers, teachers, genealogy enthusiasts, scout leaders, land surveyors, engineers, geologists, environmental specialists, law enforcement officers, historians and even root diggers. What are they? Topographic maps.

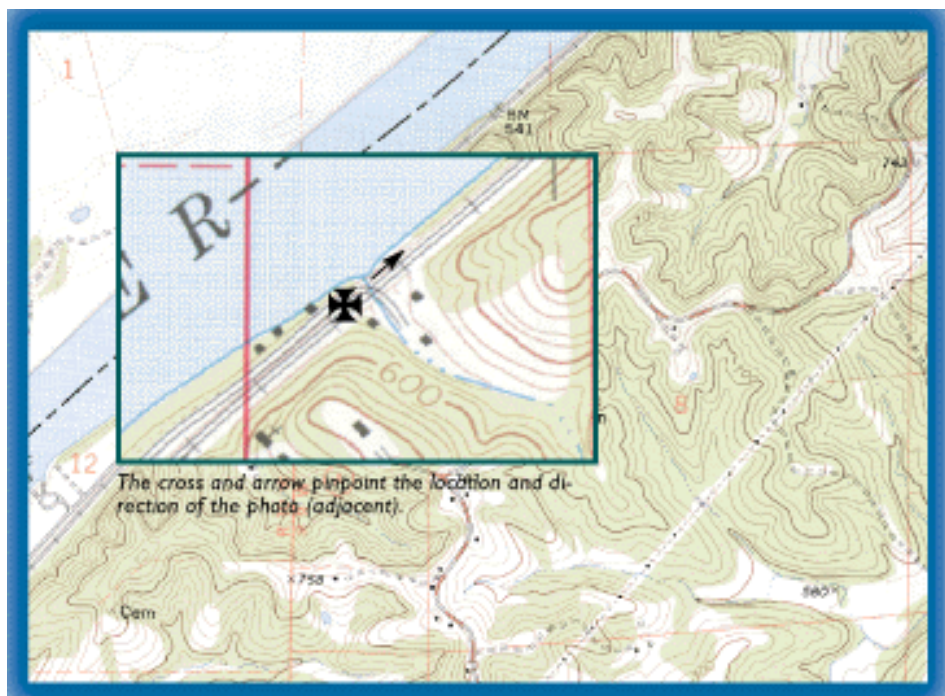
Topographic maps accurately represent the natural and man-made features of the land. They do so through the use of symbols, lines, text and color. The maps are useful for so many different purposes that a lot of people want them even if they aren't sure how to use them or what to call them.

The maps are called all sorts of things, including "plats," "charts," "section maps," "topologic maps," "quadrangle maps," "geographical maps" and "contour maps." Even the professionals who use them on a daily basis shorten their name in various ways, including "top," "topo," and "topog."

The topography of Missouri is a unique blend of natural features such as prairies, rolling hills, narrow ridges, mountainlike terrain, broad plateaus, meandering floodplains, lowlands, forests, streams, valleys, sinkholes, bluffs and rock outcrops. Superimposed upon these natural features and mingled with them are man-made features both old and new of every imaginable kind.

These "artifacts" of our visual impact upon the landscape range from trails, roads, ponds, dams, lakes, buildings, bridges, transmission lines and boundaries to cemeteries, schools, cities, towns, parks and levees. Almost no significant man-made feature is overlooked on these maps. If your house is more than 10 or 15 years old, you can probably find it, as well as grandpa's old barn, on the correct topographic (topog) map.

The scale of a topog (pronounced "toe-



A small section of a topographic map contains detailed information that mirrors the man-made and natural features of an area.

pog") map is expressed in miles, kilometers or feet on the ground. The generation of topog maps produced in the 1930s and 1940s were called 15-minute maps of latitude and longitude because they were produced at a scale of one inch on the map to 62,500 feet on the ground. The newer topog maps, produced since the 1950s, cover 7 1/2 minutes of latitude and longitude and are at a scale of one inch on the map to 24,000 feet on the ground. The overall dimensions of a 7 1/2-minute topog map are about 18 1/2 inches by 22 1/2 inches, which covers about seven miles by eight and one-half miles. At this scale, a lot of detail can be shown.

Color plays an important role in designating major features on topog maps. Black is used for the works of man such as buildings, roads, transmission lines, names and boundaries. Blue is for water, showing lakes, ponds and streams. Red is used to show major roads or highways, section lines and numbers. Green depicts woodland cover, scrub or orchards. Brown is used for contour lines, which represent land shapes and elevations.

Contour lines are useful for determining elevations and the shapes of the land. Contour lines are imaginary lines that follow the ground surface at a constant elevation, meandering around hills and up and down valleys. If you study them carefully, you can discern the shape of hills, valleys, ridges, bluffs, mounds and depressions.

The standard 7 1/2-minute topog map has a contour interval of 10 feet, which means that the difference in elevation between two adjacent contour lines is 10 feet. Every fifth contour line is an index line and is printed a thicker, darker brown. Elevation numbers are given intermittently along the index lines. If an index line indicates an elevation of 1,100 feet above sea level and the next index line is 1,150 feet, that means the ground along that imaginary line is 50 feet higher in elevation. There will be four thinner contour lines between these two index lines.

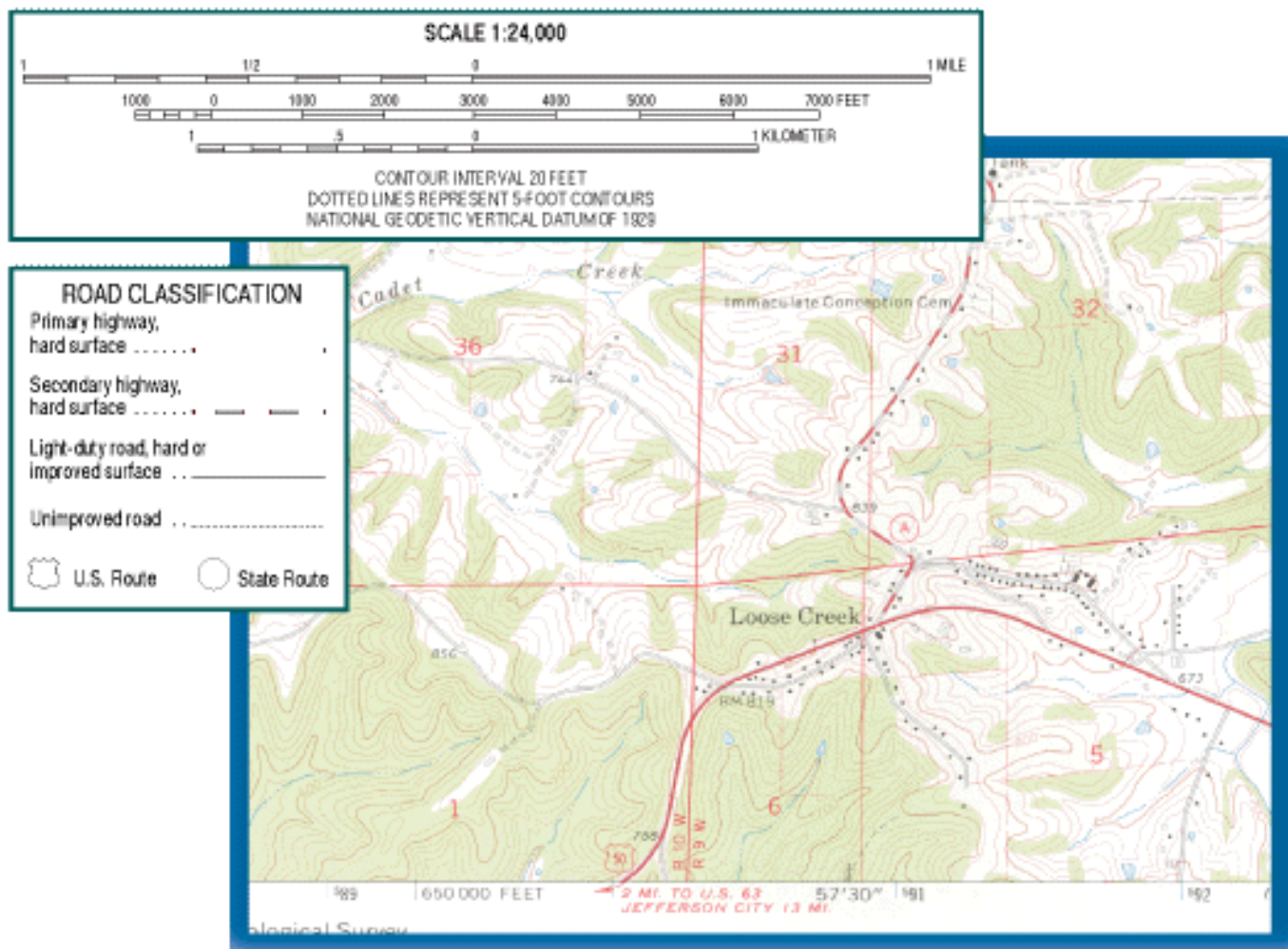
The farther apart the contour lines are from each other, the gentler the slope. The closer the contour lines, the steeper the slope. Where they merge, it means a vertical change instead of a slope. Contour lines often merge along streams and rivers where bluffs exist. Depressions, like sinkholes and ponds, are marked by depression contours – contour lines that have small barbs along one side facing inwards toward the closed depression.

Helping map users determine the specific location of natural and man-made features is one of the most important functions of a topog map. A grid with squares about 25/8 inches on a side can be seen on the topog map. These are sections, which are numbered 1 to 36 in red letters. Each section normally contains 640 acres and represents one mile square on the ground. Because the earth is not flat, and some surveyors used different methods of measurement during the early 1800s, sections are not always perfectly one mile square.

Thirty-six sections equal one civil township, which is six miles square. Rarely do you find a complete township on a single topog map. Ordinarily, there are portions of several townships. Townships are located by two coordinates – township and range. The township coordinates indicate an area's position relative to north-south lines of longitude and are found along the east and west margins of the topog sheet. The range identifies an area's position relative to east-west lines of latitude. The degrees of latitude are found along the top and bottom margins of the topog sheet. If the abbreviation for a location on a topog map is T. 27 N., R. 28 W., it refers to a township lying in the 27th tier of townships north of a central base line, and the 28th township west of the 5th Principal Meridian (a north-south survey line that is used by the U.S. Public Land Survey system and upon which all survey lines in Missouri are based).of the NE 1/4 of Section 31, Township 27 North, Range 28 West.



This photograph of railroad tracks along the Osage River near Bonnots Mill is the actual terrain that is represented on the map.



Along with the natural contours of the land, topographic maps include features such as highways, bridges, buildings and cemeteries. The scale of the maps usually are expressed in miles, kilometers or feet. This map is accurate to the scale sizes listed in its key.

For more precise locations, sections can be divided into fractions, such as quarter sections; thus, a building might be located in the SE 1/4

A basic knowledge of map reading and a little practice will help you determine locations quite easily. Having a compass with you also will help. The top of the map is north, the bottom south.

The 7 1/2-minute, 1:24,000-scale map series of Missouri was completed in 1988 through the cooperative effort of the U.S. Geological Survey and the Department of Natural Resources. This effort was started in 1908 and continued without a break until the completion of all the 7 1/2-minute maps in the Missouri series. There are 1,283 separate maps in the series for Missouri, and each one has a unique name. The number of 7 1/2-minute maps needed to cover an entire county varies from 1 to 20 depending upon the size and shape of the county.

Topographic maps may be obtained at various locations across Missouri. One of the best sources is through the Maps and Publications service of the Missouri Department of Natural Resources Geological Survey and Resource Assessment Division (GSRAD).

According to Terry Sheffield in the Maps and Publications Section at GSRAD, the staff always brace themselves for an extra rush of business as turkey and deer hunting seasons approach. Sportsmen, as a group, account for a lot of maps sold by GSRAD. Hunters want to know where the wooded areas are and their extent. Fishermen use them to find the water depth in lakes and where the deep holes are.

"We sell topog maps to a lot of people who go floating on the Current River, Eleven Point River and Jacks Fork," said Sheffield. "They use the maps to locate landmarks and geologic features that interest them."

One of the more surprising uses of the maps is by historians and genealogists who find the maps helpful because they show the old place names, old roads and trails, and a great many details of topography and geography that have been forgotten or obliterated with the passage of years.

Planners, contractors, consulting engineers and others engaged in urban and rural development routinely use topog maps, as do commissions and zoning groups. Public utilities, who provide power and light, water and sewers for all types of resource developments also need topog maps.

And then there are the root diggers, as Sheffield calls them. They are people who use the maps to locate places where only certain types of plants grow. Many of Missouri's wild plants are edible and have medicinal as well as commercial value.

Seven and one-half-minute topographic maps are not the only topographic maps available from the division. Others include the 30-minute by 60-minute map (1:100,000 scale), the one degree by two degree map (1:250,000 scale) and the state topographic map at a scale of 1:500,000. Although the old 15-minute topographic maps are no longer being printed, a limited quantity are still available. The division also has geologic maps and mineral and energy resource maps.

For a free catalog of publications and a list of available topographic maps, prices and other information, contact the Missouri Department of Natural Resources' Geological Survey and Resource Assessment Division, P.O. Box 250, Rolla, MO 65402-0250, or call (573) 368-2125.

H. Dwight Weaver is the division information officer for DNR's Geological Survey and Resource Assessment Division.

Missouri Resources Magazine

Fall 1998

Missouri Masterpieces: Top Stops for Camping in Missouri State Parks and Historic Sites

With temperatures cooling down and the landscape beginning to change into its colorful autumn coat, fall is a great time to go camping. Missouri state parks provide campgrounds in all regions of the state and to satisfy everyone's taste. Whether you like a primitive, secluded campsite or all the amenities for a recreational vehicle, there is a campsite for you in a Missouri state park.

For information on camping in more than 40 state parks and historic sites, call the Missouri Department of Natural Resources toll free at 1-800-334-6946 or 1-800-379-2419 with a Telecommunications Device for the Deaf (TDD).

Top Campsite in Taum Sauk Mountain State Park, Ironton

Campsites here are truly the top spots because this park boasts the highest point in Missouri. For a true wilderness experience at a primitive campground (just pit latrines and water), stay the night here before hiking to the state's highest waterfall, Mina Sauk Falls.

Secluded Campsite in Hawn State Park, Ste. Genevieve

For a secluded campsite that still has facilities such as showerhouses and restrooms nearby, try the walk-in sites at Hawn State Park. After parking in a central location, stroll into the forest to one of five designated walk-in campsites for your own private retreat.

St. Louis Getaway Campsite in Cuivre River State Park, Troy

If you are looking for a nice campsite not too far from the St. Louis area, try the campground at Cuivre River State Park. Featuring both basic and electrical campsites, this campground has all the amenities needed for a nice stay, along with a lake for fishing, a visitor center to explore and numerous trails.

Kansas City Getaway Campsite in Wallace State Park, Cameron

If you want to enjoy a campsite near the Kansas City area, consider the campground at Wallace State Park. In addition to basic and electrical campsites for individual campers, this campground offers an area that can be reserved for organized travel camping groups.

Accessible Campsite in Truman State Park, Warsaw

The state park system is renovating its campgrounds to make them more accessible for everyone. Recent renovations at Truman State Park make this campground a great camping spot for people with disabilities.

Northern Campsite in Thousand Hills State Park, Kirksville

Whether you prefer to camp in a tent or a modern recreational vehicle, camping at Thousand Hills State Park will provide a great base for exploring northern Missouri. The park also features a dining lodge, trails and a lake for swimming, boating and fishing.

Southern Campsite in Lake Wappapello State Park, Williamsville

Access to Lake Wappapello makes this state park a great place to camp in southern Missouri. With both basic and electrical campsites and all the facilities needed to make your stay enjoyable, there is plenty of time to fish, swim, boat or hike the trails in this rugged Ozark park.

Missouri Resources Magazine

Fall 1998

Utility Restructuring: Balancing the Pocketbook and Public Good

by Jim Muench
photographs by Nick Decker



A competitive electricity market can be wild and woolly, as seen in Pennsylvania.

In October 1997, Peco Energy Corp. of Philadelphia was about to sign a deal to continue its exclusive service arrangement for a few years in return for a 10 percent decrease in rates. Then Enron Corp. charged in with a better offer, promising to cut rates by 20 percent if the city would choose the Houston-based company.

The ensuing public relations fight included an Enron plane buzzing the 29-story Peco building while dragging a banner touting its 20 percent savings; in response, shrewd Peco television advertisements featured David Leisure, the former "Joe Isuzu," as a slimy Texan from Enron spouting 10-gallon promises.

"If you sign up today, I'll give all the kids in Pennsylvania free pony rides," smirks Leisure, in a white cowboy hat, bolo tie and chaps, with the music from TV's "Dallas" playing in the background. "I'll even throw in the Brooklyn Bridge."

Missouri has been a little more cautious because its rates are lower than most states. A "go slow" approach allows Missouri to learn from states with high-cost electric rates. The Missouri legislature discussed 10 bills dealing with utility restructuring issues this year, and a Public Service Commission task force issued a report to the lawmakers and general public in May. An interim legislative committee will convene before the next legislative session to review the task force report.

Meanwhile, Missouri utilities have begun to consolidate in preparation for competition, with Union Electric in St. Louis and CIPSCO Inc. (Central Illinois Public Service Commission) in Illinois combining to form Ameren Corp. last January. Kansas City Power and Light and Western Resources in Kansas agreed in March to combine to form Westar Energy. Warily watching electric companies grow bigger, rural electric cooperatives wonder if they'll survive.

The push to restructure the electric industry stems from new technology, geographic differences in electric prices and a desire by some customers for less regulation. Supporters say competition could lower consumers' and commercial electric bills by as much as 20 percent. Critics say competition will jeopardize public benefit services provided by utilities and result in discounts only for large customers. Others say they expect more, rather than fewer regulations.

"The change from a heavily regulated electric utility system to competition is monumental," said Steve Mahfood, director of the Missouri Department of Natural Resources, "because electricity touches every aspect of our lives and well-being in a way no other industry does.

"We want to make sure we protect Missouri's land, air and water, but especially we must protect our consumers of all classes."

The idea that electric utilities should be public monopolies covering exclusive service territories was introduced nationally in 1898 and became Missouri law in 1913. Duplication of electrical transmission and distribution systems did not seem sensible, and the prevailing technology meant electricity could be produced most inexpensively by building huge power plants.

In return for their exclusive status, electric rates were strictly regulated, and utilities were required to provide service on reasonable terms and at reasonable rates to everyone who applied. They also were expected to perform certain services for the public good, such as forgiveness of unpaid bills for the needy.

Winds of Change

New technology has changed the need for huge power plants serving an exclusive area. Combined cycle combustion turbines now allow small plants to generate electricity economically. The plants also are less expensive to build, which opens the door to competition and new ways of delivering service.

The basic components of electric service are generation, transmission, distribution and customer service. A utility generates electricity at a power plant and transmits it to electric substations that reduce the voltage and distribute it to individual consumers. The customer-service component includes services such as meter reading, mailing monthly bills, receiving and booking payments, providing technical assistance to reduce peak demand costs and assisting low-income customers in reducing their energy needs or rescheduling payments.

Generation represents a third of the average residential energy bill and is the most likely component to change in a restructured system. Generators would compete to supply power to the distributors through regulated transmission lines.

Retail vs. Wholesale

Competition can be introduced at the retail or wholesale level. In retail competition, exclusive service territories for local utilities would no longer exist. Consumers could shop between various companies. Electricity would be delivered to the consumer either by the local utility, which would distribute power generated by every producer available, or by another distributor.

A wholesale competition system would maintain the exclusive territories of local utilities, but also force them to compete for power on the open market. Local utilities might be required to spin off their power plants into separate

companies. Their competitors would not sell directly to individual consumers but back to local utilities. Those savings could be passed on.

Because of relatively low energy costs, others believe electric rates would increase in Missouri under competition and exceed current regulated prices. This would result in "negative" stranded costs over the lifetime of the generating assets, eliminating the need for consumers to pay for previous investments. Stranded costs are investments made by utilities that may not be recoverable in the price of electricity set by a competitive market.

California, the 12th most expensive state (9.48 cents per kwh), began its "Retail Wheeling" plan in March. Retail wheeling is the term for letting generators sell power to any willing buyer. The California plan mandates a 10 percent reduction in rates up front and another 10 percent reduction in 2002. Critics say electric rates would have been lower under the current system.

Stranded Costs and Benefits

Stranded costs could include power plant expenses already incurred under the previous set of regulations such as facilities, equipment and long-term purchase contracts that may not be economic or recoverable if faced with cheaper electric rates under competition. In California and Illinois, consumers continue to pay for the decisions made under the previous regulatory system.

In Missouri, energy is relatively inexpensive. Our state has the 24th lowest average energy costs (6.11 cents per kilowatt hour) and is three-quarters of a cent below the national average cost (6.86 cents).¹

On the other hand are public benefits, or services. These are benefits and consumer protections provided for the public good. Under competition these could become "stranded" benefits if utilities determine them not to be cost-effective. For instance, current regulations provide consumer protections for low-income customers during cold weather. At present, public benefits services are paid for through taxes, electric rates and cooperative arrangements with private firms.

Public-benefit services also include environmental benefits of energy-efficiency programs, renewable-energy initiatives, and research and development. Other important programs provide affordable rates for low-income consumers, deferred payment plans, discounts for senior citizens or people with disabilities, and weatherization services for low-income customers.

"Many states have instituted a wires charge or energy-usage charge to fund low-income energy efficiency and other public-interest programs," Wright said.

Low-income issues

Another area of concern lies in how competition will affect low-income households. This begins with the possibility of electric "red lining," the practice of avoiding service to specific groups or areas, such as inner-city or rural neighborhoods.

"You can survive without banking and insurance, but you can't survive without electricity," said Ivan Eames, special projects coordinator for Central Missouri Counties' Human Development Corp. "It's a basic necessity, especially in the



AmerenUE lineman Chip Webb replaces one of several poles damaged during a June thunderstorm. Utility competition may mean one company generates electricity while another company distributes it.

winter."

Experience with other industries has shown that competition often imposes higher costs and lesser service on those customers least able to pay. Access to banks, telephones, health care and insurance often is harder to obtain. Will access to electricity become just as exclusive?

Experts say an answer may lie in the formation of energy cooperatives, in the style of rural cooperatives or credit unions, that would boost consumers' economic clout.

Small Consumers

While competition probably will bring discounts for large businesses, how will utility restructuring affect the average consumer? Will small businesses see similar savings, or will they be in for the realization that big business' gain results in their loss?

"Any change in the electric industry may have unintended consequences for better or worse," said DNR Director Steve Mahfood. "The challenge is to have a system that provides lower prices, while safeguarding consumers from unforeseen ill effects."

Under competition, large industrial consumers would have the ability to bargain for the best energy deal, which could mean millions of dollars in annual savings.

When compared to large industrial consumers, the potential profit when selling to residential and small business customers is lower, and the marketing and billing costs are higher. Without careful consideration, small consumers may not benefit from utility restructuring, may pay more and receive less.

As an example, consumers who miss a payment may face speedier disconnections because companies will not be as lenient as the current system's "local" utilities. And questions abound about the new roles of the generators and distributors.

If customers want to file a complaint about a faulty meter, to whom do they turn, the generation company from which the electric bill comes or the distributor that owns the meter?

These new roles can cause electric companies to get cold feet. Enron Corporation (a large natural gas and electricity wholesale marketer mentioned at the beginning of this article) has announced it will no longer market its services to residential consumers in California.

Marketing practices also may become an issue. Will citizens be subjected to annoying dinnertime calls from oh-so-friendly salespeople wanting us to switch electric? Another undesirable practice, "slamming," the switching of a

customer from one electric company to another without the customer's knowledge, might be possible. Any changes must include ways of avoiding these scenarios so Missourians will be able to enjoy the benefits of change.

Environmental Issues

Aside from all of the other issues, increased competition may or may not be good for the environment. Competition could lead to greater energy efficiency, as a result of market forces which could mean less pollution, but it also could lead to increased energy use. Competition has encouraged electric utilities to reduce investments in environmental protection programs.

Although nobody knows for sure whether rates will increase or decrease in a changing utility environment, if rates drop and consumer demand rises, pollution could increase as more electricity is generated. The power sector is the nation's single largest source of pollution, accounting for about 67 percent of sulfur dioxide emissions and 28 percent of nitrogen oxides in 1996, according to data from the U.S. Environmental Protection Agency.

Also, electricity generation creates 35 percent of the nation's emissions of carbon dioxide, the primary greenhouse gas, according to the U.S. Department of Energy. That agency reported that in 1996, greenhouse gases increased nationally by 3.4 percent. A 1990 joint DNR Division of Energy and Environmental Improvement and Energy Resources Authority study showed that 46 percent of Missouri's carbon dioxide emissions were produced by electric utilities.

Improvements to power plants may reduce emissions, but expanding demand could nullify the reductions. To meet increased demand, utilities may choose either to push more power out of old plants or build new plants. Older plants can avoid compliance costs with the most recent regulations. Therefore, many companies may extend the older plants' operational lives rather than invest in "cleaner" technology.

Since 93 percent of Missouri's electricity comes from the burning of coal, encouraging the use of new technology is important. "Increased competition itself will not affect the environment, but deregulating the generation of electricity might," Mahfood said. "The question is will the more environmentally safe generation facilities be able to compete, or will new ones built be as environmentally safe as they are now."

Speculation Abounds

A competitive industry could generate countless possibilities. Competition may be especially hard on the environment of low-income neighborhoods. Because of lower property values, real estate in low-income neighborhoods may attract new electric plant sites, and tight-knit neighborhoods may be split by transmission lines. Besides aesthetic problems with power plants, low-income neighborhoods would experience more noise, air and water pollution.



The enormous start-up costs of nuclear plants, like Callaway, might well give way to smaller, more numerous combined-combustion turbine facilities.

In addition, competition could lead companies to resurrect previously shut-down plants in urban areas, leading to increased pollution from coal-burning plants, which create acid rain and ground-level ozone. Combustion also releases heavy metals such as mercury (32 percent nationally comes from power plants) that contaminate soil and water.

Meanwhile, if market conditions make it profitable, new plants also could sprout in rural areas to supply the needs of cities in Missouri and other states. Because cities with high electric demand often must abide by strict zoning rules or air pollution abatement programs, Missouri's rural areas may be susceptible to this demand and the pollution it generates.

One way to deal with increasing future demand for electricity and the pollution it generates is for consumers to demand that suppliers provide more of innovative electricity products such as "green power." Green power allows consumers to support the production of energy from renewable sources such as biofuel, solar, geothermal and wind.

Through greater energy efficiency, informed consumers can choose to lower their energy costs, reduce demand for electric power and cut pollution, help to slow the need for more power production and improve national self-sufficiency. However, utilities will face a strong disincentive to reduce customers' electricity use since kilowatts equal profits.

Still, utilities will have to meet all existing pollution control regulations. Regulatory agencies will need to cooperate closely with utilities as new operational strategies are explored in efforts to meet compliance requirements. Because energy use is integral to the quality and health of the environment, DNR will continue to be actively involved in Missouri's debate of electric utility restructuring to ensure the public is better off after the dust settles.

Although many questions about the future structure of Missouri's electric utilities industry remain, a general consensus seems to be developing about what the questions are. To avoid a baffling hodgepodge of vastly different systems, coordination between states should be an urgent priority. Guidelines issued by the Clinton administration last March may provide a framework.

While the heart of Missouri's debate lies in the future, the many pieces of the puzzle are slowly falling into place. As for the public relations war in Pennsylvania, Enron's blitzkrieg paid off when the state legislature junked Peco Energy's exclusive arrangement, as well as Enron's plans. They set new rules to open the eastern Pennsylvania market to all competitors by the year 2000, creating an opening for the type of energy wheeling and dealing that is becoming the norm.

Stay tuned. Missouri's high wire act has just begun.

For further information about utility restructuring, please contact the Energy Information Center, P.O. Box 176, Jefferson City, MO 65102-0176, (573) 751-6654. The center also can be reached via their e-mail address at energy@mail.dnr.state.mo.us

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